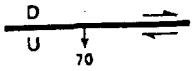
EXPLANATION



Fault rupture of Loma Prieta earthquake--Arrows show relative horizontal movement; small arrow and numeral show direction and amount of dip; U, upthrown side; D, downthrown side

Fault--Dashed where approximately located

Main shock epicenter

Area of aftershocks and abundant landslides

Area of ground cracks possibly related to faulting

Approximate limit of major structural damage

Approximate limit of landslides

(L) Prominent area of liquefaction

(B) Damaged bridge

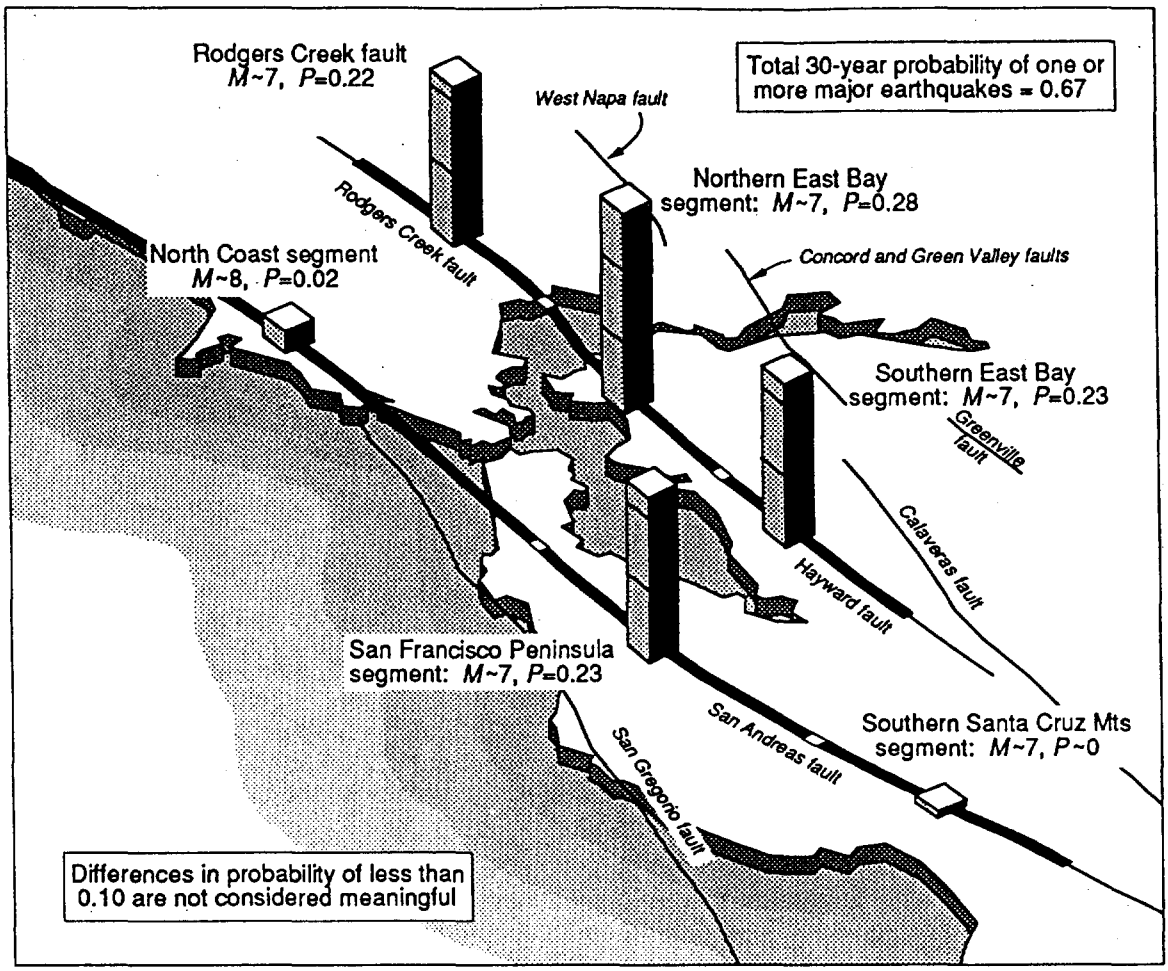
(D) Damaged dam

(V) Damaged two-story viaduct

Figure 1. Continued

ATTACHMENT E

(PAGE 2/2) SOURCE: REF. 4



30-YEAR PROBABILITIES (*P*) OF LARGE EARTHQUAKES (*M*≥7) IN THE SAN FRANCISCO BAY REGION

Column heights are proportional to 30-year probability of earthquake rupture

ATTACHMENT F

SOURCE: REF. 6

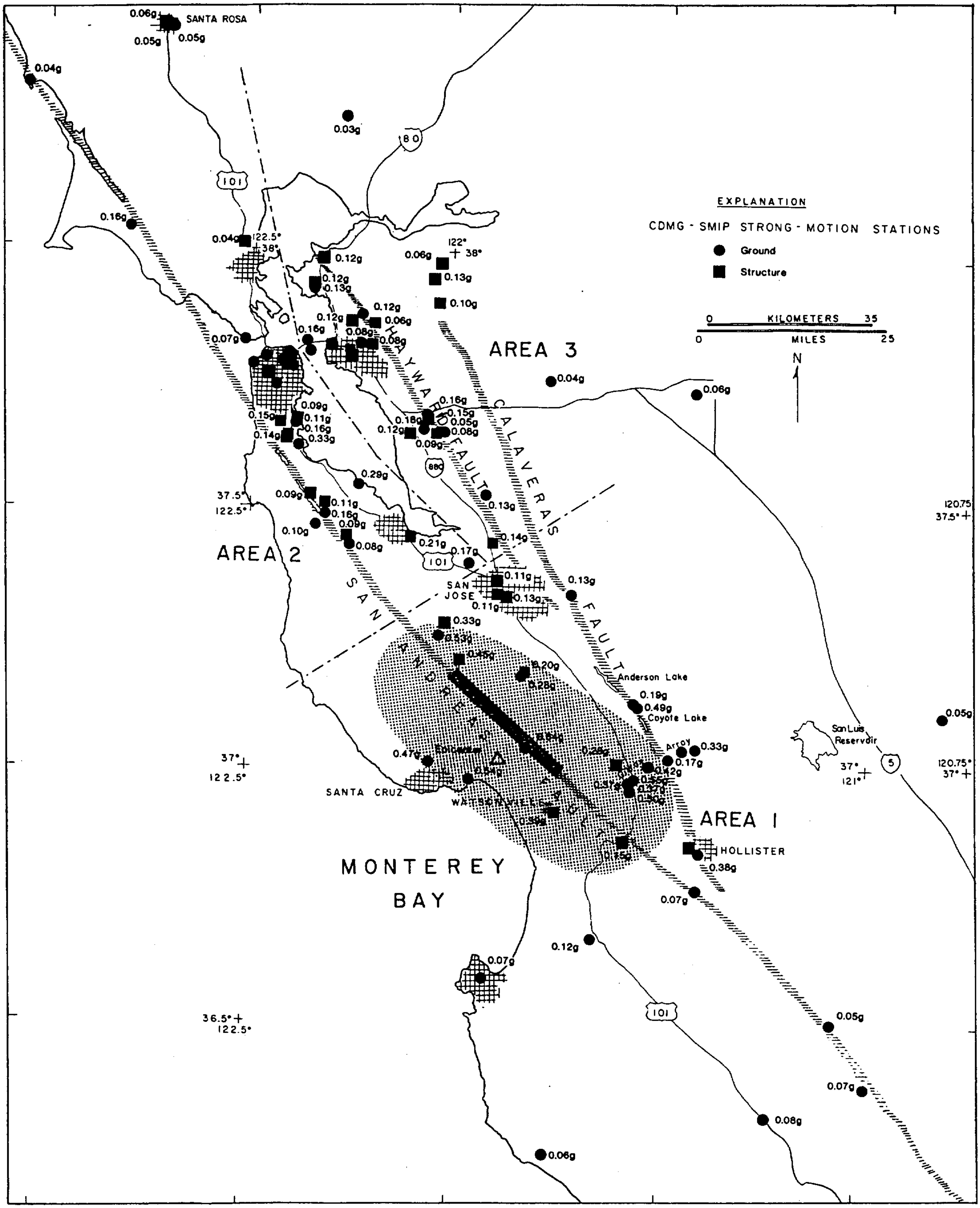


Figure 11. Strongly shaken zone (stippled area) for the 17 October 1989, Loma Prieta earthquake (peak acceleration generally 0.4 g or greater).

ATTACHMENT G

SOURCE: REF. 7

ATTACHMENT H

SOURCE: REF. 8

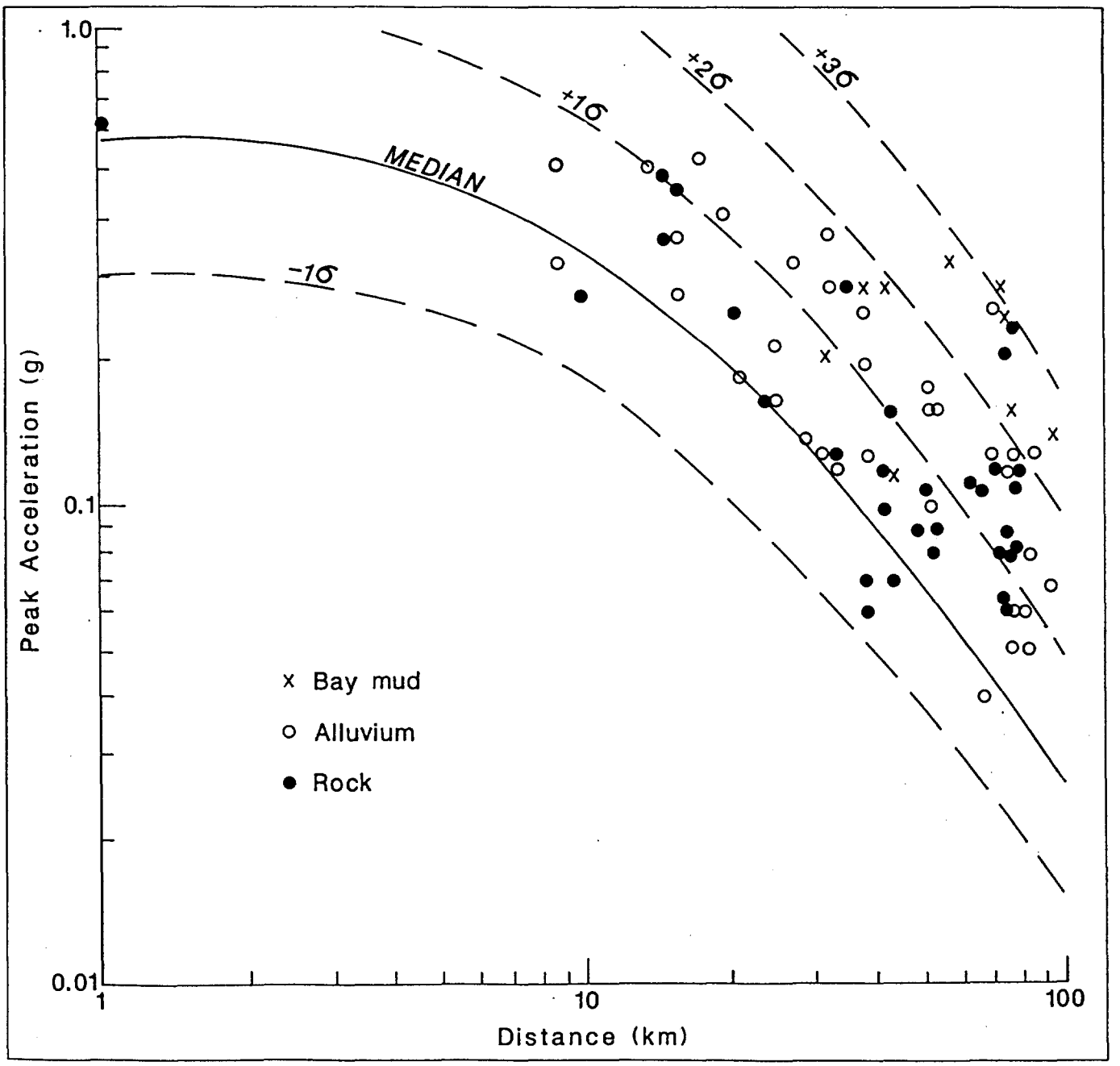


Figure 1. Peak horizontal acceleration versus distance. Distance measured from the surface trace of the San Andreas fault above the Loma Prieta aftershock zone. Largest of the two horizontal components is plotted. Solid line is the median curve of Joyner and Boore (1981) for a moment magnitude 6.9 earthquake. Dashed lines indicate median -1, +1, +2 and +3 standard deviations. Solid dots indicate stations located on (or near) rock; open circles, on alluvium; x's, on bay mud.

STATEMENT OF MADISON J. BATT, CONSULTING ENGINEER

I, Madison J. Batt, declare the following:

1. I am an Associate in the Structural Engineering division of TRA Architecture Engineering Planning Interiors, Ltd. (TRA), a multi-disciplined architectural/engineering firm headquartered in Seattle, Washington. I have been employed with the firm since February, 1988. Prior to joining TRA, I was employed as a structural engineer from 1978-1988 by Skilling Ward Magnusson Barkshire, Inc., a structural engineering firm headquartered in Seattle, Washington. I have had over 19 years of extensive practical experience as a Professional Civil/Structural Engineer concentrating on the design and analysis of structures. I have been responsible for the seismic analysis of many structures and have recently designed the seismic frames on several large building projects. In the past nine years I have specialized in tower engineering with emphasis on design, inspection, and analysis of communications towers.

2. I am currently serving as the Project Director for the US Coast Guard West Coast Tower Inspection Project. Working with the Civil Engineering Unit in Oakland, California we are inspecting 110 towers for this project. I am also serving as the Project Director on the FY92 High Antenna Tower Inspection Project for the Department of the Navy, Pacific Division, as well as Project Director of the City of Seattle, West Seattle Radio Tower Replacement Project. I have also designed several guyed and microwave communication towers ranging from 100' - 300' in the Northwest.

3. I was the structural project engineer responsible for the design of the seismic moment frames, braced frames and shear walls on the Snohomish County PUD expansion Project in Everett, Washington. Prior to that I was part of the team that provided a seismic analysis of the the VA hospital in Spokane, Washington. In addition, I was the Engineer responsible for the design of the Eccentric Braced Frame system for the Health Sciences H-Wing Addition at the University of Washington.

4. I received a B.S. in Science and Civil Engineering from the University of New Hampshire in January, 1974 with special emphasis in Structures. I did Post Graduate Studies at the University of Washington with emphasis in Structures in 1977.

5. I am a current and active member of 5 engineering related professional organizations; Society of Broadcast Engineers; Structural Engineers Associatione of WA, American Institute of Steel Construction; American Society of Civil Engineers; and the Society of Military Engineers.

6. I have authored and/or co-authored several articles relating to towers published in Television Technology a television communication trade magazine.

7. I am a registered Structural Engineer in the states of California, Washington and Wyoming and a registered Civil Engineer in the states of California and Washington.

8. My resume related to tower and seismic projects is presented as Exhibit 1.

9. I have been retained by Hammett & Edison, Inc. to review the potential seismic hazard of the transmitter tower site of station KNTV, specifically a lateral and seismic study of the tower.

10. As part of my review I visited the site on 10 July 1993 and viewed the KNTV tower as well as several other towers on the site.

11. The top of Loma Prieta peak is an important communication site. There are several other significant tower structures on the mountain top, the most notable are for telephone microwave links, TV & FM antennas, TV microwave links, television translators and two way communication antennas.

12. I am advised that damage to the tower in the 1989 Loma Prieta Earthquake was limited to the top of the tower and the top-mounted antenna. Considering the proximity to the earthquake epicenter, this damage was minor compared to the damage sustained on building structures as far away as San Francisco.

13. A flexible structure is defined, in the wind load section of Reference 2, as a structure that has a height to least horizontal dimension greater than 5 or having a frequency that is less than 1.0 Hz. The KNTV tower has a height to width ratio of 47 > > 5. The period of the tower is approximately 1.5 seconds therefore the frequency equals 0.67 hz < 1.0 hz. Therefore the KNTV tower is considered a flexible structure.

14. Tower design loads generally consider the self weight of the structure; antenna and other equipment and attachments; ice; wind; and seismic effects. The lateral design is usually controlled by the wind load for tall guyed towers. The wind load is a function of the dynamic structural properties of the tower (flexibilty); the exposed surface frontage of the tower structural members and attached equipment; the ground wind speed; and local terrain effects that tend to increase the wind speed in hilly and mountainous areas (Ref. 4). The three primary reference design standards for the development of the design wind loads are; the Uniform Building Code (Ref. 1); ASCE (Ref. 2); and EIA/TIA-222-E (Ref. 3). Based upon the above parameters, I estimate that [redacted]

15. The UBC defines the seismic design load with the goal of preventing major structural collapse while accepting some structural damage during the life of the structure. Additionally, the UBC recognizes the inherent ductility (ability to absorb energy) of different structural systems and adjusts the design load accordingly. The acceptance of some structural damage is related to the economics of managing the seismic risk along with the other risks. The UBC accounts for the ductility of the structural system by reducing the anticipated dynamic limit state base shear force to a working stress or design base shear. This reduction from limit state (actual maximum anticipated) to design force is approximately a factor of 1.5 for tower structures. The UBC design base shear at this site would be 0.20g (0.2 times the weight of the structure) or a limit state of approximately 0.30g. The actual ground acceleration experienced at

19. Given that the tower experienced strong ground acceleration as noted above and that the damage was limited to the top of the tower and antenna, I do not believe that the tower needs any additional strengthening in order to withstand anticipated future earthquakes.

20. However, there is one element that may require modification. Guyed towers usually frame to a pinned base. The base of the KNTV tower is bolted directly to the concrete foundation at each leg (fixity). See Attachment A for an example of this condition. This does not allow rotation of the base (pinned connection) and therefore the bottom of the tower may experience large bending moments. This could have contributed to the damage to the antenna because of the added stiffness from the fixed base condition. Unless this tower was designed for the bending moments associated with the fixity, the bottom of the tower should be modified to a pinned base. This can be done by jacking the tower up and installing a base system that sits on a pin installed in the concrete base (See Attachment B). Alternately, the bottom section could be changed to a tapered section by jacking the tower up and installing the new section and a pin at the base. The cost for this work (either method) including the engineering required should be around $20,000.

21. I declare that the foregoing is true to the best of my knowledge and belief.

Dated July 15, 1993

Madison J. Batt

Madison J. Batt, P.E.

[towers]reports.ac6

REFERENCES

1. Uniform Building Code (UBC), 1991 Edition, International Conference of Building Officials. Part V, Chapter 23, Section 2330, Earthquake Design.

2. ASCE STANDARD, Minimum Design Loads for Buildings and Other Structures, ASCE 7-88 (Formerly ANSI A58.1), 6. Wind Loads

3. EIA/TIA Standard, EIA/TIA-222-E, Structural Standards for Steel Antenna Towers and Antenna Supporting Structures, 1991.

4. Lemelin, D. R.; Surry, D.; and Davenport, A. G.; Boundary Layer Wind Tunnel Laboratory, The University of Western Ontario, London, Ontario, Canada; (1988); "SIMPLE APPROXIMATIONS FOR WIND SPEED-UP OVER HILLS"; Journal of Wind Engineering and Industrial Aerodynamics, 28 (1988) pgs. 117-127

EXHIBIT 1

MADISON J. BATT, P.E. **TRA**
Associate
Project Structural Engineer

Summary

Mr. Batt has over 19 years of extensive experience serving as a Civil/Structural Engineer. He has been responsible for the seismic analysis of many structures and has recently analyzed and/or designed seismic frames on several large projects. For the past nine years he has specialized in tower engineering and has been responsible for the design, inspection, and analysis of communication towers located throughout the West Coast. Currently, Mr. Batt is serving as the Project Director for the US Coast Guard West Coast Tower Inspection Project, Civil Engineering Unit, Oakland, Ca. He also is serving as the Project Director on the FY92 High Antenna Tower Inspection Project for the Department of the Navy, Pacific Division. In addition, he is the Project Director for the City of Seattle, West Seattle Tower Project which includes responsibility for the design of a 140 foot self-supporting microwave communication tower. Recently, he was responsible for the design of a 100 foot replacement tower for the Washington State Patrol at Boistfort Peak, Washington. He also designed two 310 foot guyed replacement towers for KBSN AM and KDRM FM in Moses Lake, Washington. Mr. Batt also recently evaluated and designed guy replacements for a 400 foot tower, located on Mt. Constitution, Orcas Island, Washington.

Education

University of New Hampshire, Durham, New Hampshire,
Bachelor of Science, Civil Engineering, 1974

University of Washington, Seattle, Washington,
Post Graduate Studies, Structures, 1977

Wind Engineering Seminars, 1989 & 1992

Registration

Registered Civil Engineer, Washington, 1979
Registered Structural Engineer, Washington, 1981
Registered Civil Engineer, California, 1991
Registered Structural Engineer, California, 1991
Registered Structural Engineer, Wyoming, 1992

Selected Experience

TRA Architecture Engineering Planning Interiors, Ltd.
Associate and Structural Engineer, since 1988

Skilling Ward Magnusson Barkshire Inc., Seattle, Washington,
Associate, 1978-88

MADISON J. BATT, P.E.
Associate
Project Structural Engineer

Relevant Structural Project Experience

Tower Projects

US Coast Guard, Civil Engineering Unit, Oakland, California, Inspection of 110 Towers in Washington, Montana, Oregon, Nevada, and California, Project Director, 1993

Department of the Navy, Pacific Division, FY92 High Antenna Tower Inspection Project, Inspection of 36 Towers in Hawaii, Washington, Japan and Okinawa, Project Director, 1992-1993

Eastside Public Safety Tower Analysis, Bellevue, Washington, Analysis of two towers for new 800 mhz communication system and recommendations, Project Director, 1993

City of Seattle, West Seattle Tower Project, Seattle, Washington, design of a 140 foot self-supporting microwave communication tower, Project Director, 1991-93

KXLY Radio Tower Inspection, Spokane, Washington, Inspection of 454 foot AM Freestanding Tower, Project Director, 1992

KOMO TV Tower Inspection, Seattle, Washington, Inspection of 400 foot TV Tower and Ultra Sound of antenna mast for wall thickness, Project Director, 1992

KOMO AM Radio Tower Inspection, Seattle, Washington, Inspection of three 500 foot guyed towers, Project Director, 1992

KVEW TV Tower Inspection, Pasco, Washington, Inspection, Analysis and repair project of 200 Guyed Tower, Project Director, 1992

KCWC TV Tower, Limestone Mountain, Wyoming, 200 ft Guyed Tower Analysis and Upgrade Project, Project Director, 1992

Washington State Patrol, Baw Faw Replacement Tower, Boistfort Peak, Washington, design specifications for a new 100' communications tower, Project Director, 1992

State of Washington, Department of Natural Resources, Various locations in Washington, Communication tower inspection and grounding design project at 10 sites, Project Director, 1992

KPUG AM guy replacement project, Bellingham, Washington, inspection and guy replacement for two 210 foot AM radio towers, Project Director, 1991

Medford Municipal Airport FAA ASR 9 Tower, Medford, Oregon, Foundation design for new tower, Project Director, 1991

Mt. Constitution Tower, Orcas Island, Washington, guy replacement for a 400 foot tower, Project Director, 1991

KBSN AM and KDRM FM towers, Moses Lake, Washington, designed two 310 foot guyed replacement towers, Project Director, 1991

Washington State Patrol, Beezley Hill Communication Tower, Ephrata, Washington, Tower Inspection, Project Director, 1991

Mt. Constitution, Orcas Island, Washington, evaluation and recommendation report for 400 ft. communication tower, Project Director, 1990-91

KAPP Tower Inspection, Yakima, Washington, Project Director, 1991

KXXO Radio Tower, Rooster Rock, Washington, Structural Inspection, Project Director, 1990

KCPQ Channel 13, Tacoma, Washington, Tower Evaluations, Project Director, 1990

State of Washington, Department of Natural Resources, Various locations in Washington, Multiple communication tower retrofit documents and construction inspection, Project Director, 1990

Federal Center South Communication Tower, Seattle, Washington, Inspection and recommendation report, Project Director, 1990

Army Corps of Engineers, Adams Ridge HF/SSB, Eastern Washington, Antenna Towers Inspection and report, Project Director, 1989

KCTS-TV, Seattle, Washington, Tower inspection, Project Director, 1988-89

State of Washington, Department of Natural Resources, Various locations in Washington, Communication tower inspection report and grounding designs at 7 tower sites, Project Director, 1988

MADISON J. BATT, P.E.
Associate
Project Structural Engineer

Relevant Seismic Project Experience

Seismic Projects

Snohomish County PUD Headquarters Expansion, Everett, Washington, Design of Seismic Frame system for 5 story office building, Project structural manager for office building, Training Center, and Post Tensioned Parking Garage, 1991 - 1993

Veterans Administrations Hospital Seismic Analysis, Spokane, Washington, seismic analysis of existing hospital structure using ETABS, Project Engineer, 1992

H-Wing Health Sciences Addition, University of Washington, Seattle, Washington, Seismic frame analysis and design, Project Structural Engineer, 1991

Seattle School District #1, Capitol Improvement Program, Muir Elementary School, Seattle, Washington, Structural compliance review, 1990

Existing G & H Wings, Health Sciences Facility, University of Washington, Seattle, Washington, Seismic capacity study, 1990

Security Pacific Bank Building Renovation, Seattle, Washington, Seismic analysis and upgrade, 1989

Dexter Horton Building, Seattle, Washington, Seismic study and evaluation reports, 1989

Seattle School District #1, Capitol Improvement Program, Lawton

MADISON J. BATT, P.E.
Associate
Project Structural Engineer

Seattle School District #1, Capitol Improvement Program, Olympic View Elementary School, Seattle, Washington, Structural compliance review, 1989

United Airlines Maintenance Facility, Sea-Tac International Airport, Seattle, Washington, Seismic analysis and design of framing, 1988

Loma Linda UMC, Phase Two, Lateral frame design, Loma Linda, California, 1987

St. Agnes Medical Center, Fresno, California, Seismic analysis, 1986

Washington State Convention and Trade Center, Seattle, Washington, Preliminary lateral design, Field surveillance, 1984

Swedish Hospital Medical Center, Southwest Addition, Seattle, Washington, Seismic evaluation and six-story addition to existing building, Project Structural Manager, 1983

Existing Veterans Hospital, Seattle, Washington, Seismic analysis, 1981

Publications

"Concrete Tower Upgrade", Television Technology, Madison Batt, August 1988

"A Fresh Look at Guyed Towers" Television Technology, Tony Tschanz and Madison Batt, February 1988

"Have a Pro Inspect Your Tower", Television Technology, Tony Tschanz and Madison Batt, January 1988

"Examining Tower Structures", Television Technology, Tony Tschanz and Madison Batt, December 1987

Service and Affiliations

Associate Member: Society of Broadcast Engineers
Member: Structural Engineers Association of WA
Member: American Institute of Steel Construction
Member: American Society of Civil Engineers
Member: Society of Military Engineers

ATTACHMENT A

ATTACHMENT B

This is a photo of a guyed tower with a frame that supports the tower to a pinned base.

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Seattle, Washington 98104-1551
(206) 682-1133 FAX (206) 343-9537

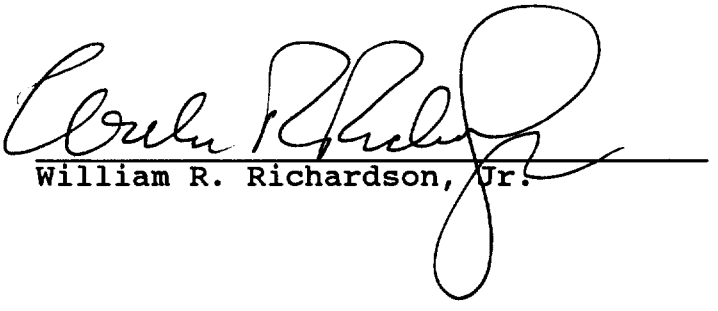
TRA
Tower Engineering & Inspection

CERTIFICATE OF SERVICE

I, William R. Richardson, Jr., hereby certify that I have this 19th day of July 1993, caused to be delivered by hand copies of the foregoing "Comments of UTV of San Francisco, Inc. and KGO Television, Inc.," to the following:

Michael C. Ruger, Chief
Allocations Branch
Policy and Rules Division
Mass Media Bureau
Federal Communications Commission
2025 M Street, N.W., Room 8318
Washington, D.C. 20554

Tom W. Davidson, Esq.
Paul S. Pien, Esq.
Akin, Gump, Strauss, Hauer & Feld, L.L.P.
1333 New Hampshire Avenue, N.W. - Suite 400
Washington, D.C. 20036



William R. Richardson, Jr.